



## Case report

# The initial management of complete urethral disruption in a deployed military field hospital

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## ABSTRACT

**Background:** The management of male urethral trauma in the multiply injured battle casualty has proved challenging to the deployed military trauma surgeon. Foreign nationals will need culturally sensitive outcomes with adequate urinary function when further surgical management is unlikely to be available in a developing country. For those likely to undergo reconstructive surgery, the early restoration of anatomy is important as it may improve the long-term reconstructive outcome.

**Method:** We illustrate our technique with a case report and discuss salient points of other patients treated in the same manner, all of whom presented to a role 2 (enhanced) field hospital in Afghanistan with urethral injuries.

**Results:** A transpelvic high velocity gunshot wounds (HVGSW) was sustained and the patient underwent immediate anatomical re-alignment of the urethra with suture of the bladder neck to the pelvic floor. This case is discussed in detail.

**Conclusions:** Complete disruption of the male urethra can be successfully managed in the field hospital by urethral catheterization at the time of initial surgery. In patients where further reconstruction may not be possible, urethral catheterization provides a culturally permissible solution for patients. In those who may undergo further reconstructive surgery, approximation of the bladder to the pelvic floor may reduce stricture rate in comparison with the suprapubic catheterization alone.

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## 1. Background

Urogenital trauma occurs in a significant proportion of battle casualties injured during the conflict in Afghanistan. Throughout the conflicts of the 20th Century these injuries have been technically challenging for deployed military trauma surgeons, not least because the majority of such injuries are present in patients with multiple injuries, often with complex pelvic trauma. With improved battlefield survival rates and improved outcome as a result of damage control resuscitation and surgery, more casualties with significant urogenital trauma are surviving.

Approximately 3% of battle casualties sustain urogenital injury compared to 10% of civilian trauma patients. Battle casualties will sustain a higher proportion of penetrating urogenital injuries in comparison to the primarily blunt nature of civilian injuries.

Urogenital injuries from blast and gunshot differ in their mechanism and outcome.

This paper focuses on battle casualties with injuries to the bladder neck, prostate and prostatic urethra as a result of high velocity gunshot wounds (HVGSW) to the pelvis.

## 2. Method

A patient presented alive to a deployed military role 2 (enhanced) hospital facility during a seven week period of Operation HERRICK 9 (Afghanistan, October to November 2008), following HVGSW to the pelvis. The mechanism of injury, initial resuscitation, timing of the radiological imaging and surgery is discussed.

## 3. Results

On arrival at the deployed medical facility, each patient is met by a trauma team comprising consultants in emergency medicine, anaesthesia, orthopaedics and general surgery. The primary

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resuscitation included emergency laparotomy to achieve haemorrhage control.

#### 4. Case

A 42-year-old male sustained a 'through and through' HVGSW to the pelvis and the right chest. One round entered the right buttock, coming to lie in the left groin. On arrival at hospital the patient was alert, his airway was clear, but he had laboured breathing with a respiratory rate of 23 breaths per minute. A right sided chest drain had been inserted by a medic at scene. His pulse was 110 and his BP 98/50. His abdomen was distended and tender. There was active haemorrhage from his pelvic wounds despite direct pressure (Fig. 1). Bony fragments were present within the rectum on digital examination and the prostate was not palpable. A round lodged within the pelvis with fragmentation is seen at Fig. 2.

Damage Control Resuscitation (DCR) and resuscitative laparotomy [12] with pelvic packing and surgical control of the iliac and femoral vessels, was undertaken within 10 min of arrival in the facility. These surgical manoeuvres controlled the pelvic haemorrhage and DCR restored physiological normality. There was no intra-peritoneal injury. The bladder was found to be distended with blood, the prostate and bladder neck shattered and the pelvis fractured with intra-rectal bony fragments. An intraoperative CT scan confirmed the pelvic injuries and excluded significant intra-thoracic injury, thereby avoiding an unnecessary thoracotomy.

As the patient's physiology had normalized, definitive surgery was undertaken immediately after the CT scan. A Hartman's procedure was performed to manage the rectal injury. After lavage and assessment of the bladder, confirming patent ureteric orifices, a urethral catheter was passed under direct vision through the defect in the base of the bladder which was closed with a purse-string suture. The base of the bladder was then sutured to the pelvic floor with the catheter balloon inflated and gently tensioned to restore anatomy. A suprapubic catheter was placed for irrigation and was later used to facilitate antegrade cystography. The surgical wounds were closed and the battle wounds managed according to standard military procedures.

The patient was discharged, walking with crutches, on the twelfth post-operative day to the local International Red Cross (IRC) Hospital. It was envisaged that the catheters would be



Fig. 1. Direct pressure applied to the femoral vessels and gunshot wound fails to control the haemorrhage.

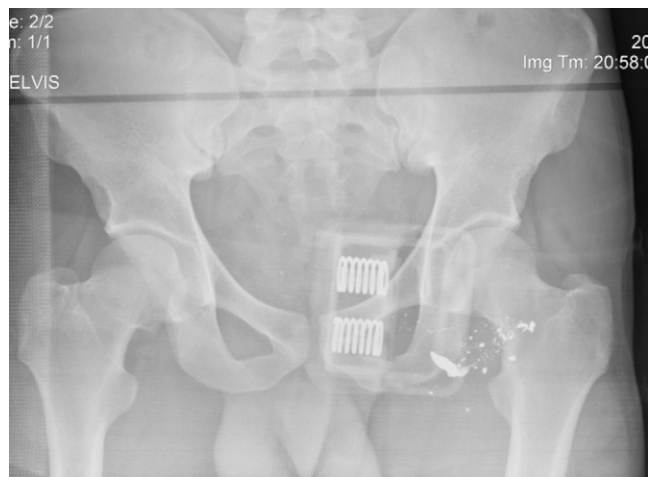


Fig. 2. Initial trauma pelvic X-ray demonstrating the ballistic fragments in the left groin (entrance wound by the right greater trochanter).

removed after 4 weeks and the urethral catheter replaced if the patient was incontinent of urine.

#### 5. Discussion

During the conflict in Afghanistan from 2001 to 2011 injury mechanisms have included high velocity gunshot wounds (HVGSWs), mines and improvised explosive devices (IEDs). The pattern of injury is changing with a higher proportion of blast injuries associated with IEDs [9,11,20]. It is unusual for battle casualties to have isolated injuries and their initial management [5] including the timing of imaging [15], plays a significant part in the improved survival seen over recent years.

Approximately 3% of battle casualties sustain urogenital injury (range 0.5–4.2%) [17,19]. This is compared to 10% of civilian trauma patients [14], although a significantly higher proportion of battle casualties will sustain penetrating urogenital injuries in comparison to the primarily blunt nature of civilian injuries [4]. Indeed only 10% of all civilian urethral trauma is penetrating in nature. Penetrating urogenital injuries within a military setting are primarily from HVGSWs that produce significant damage to the surrounding tissues, in addition to the trauma caused by the direct path of the round [8] or from fragmentation. Approximately 55% of all military injuries involve the external genitalia (29.4–68.1%) [17]. Penetrating posterior urethral trauma is usually associated with other injuries from the penetrating object and a significant proportion occur in patients who have sustained multiple injuries from other missiles [3].

Disruption of the prostatic urethra poses a significant reconstructive challenge, particularly in a deployed field hospital [16]. In a specialist setting, staged repair of the posterior urethral injury has been advocated. A suprapubic catheter is placed and endoscopic realignment of the fragmented urethra is attempted, if possible during a primary procedure. Strictureplasty is undertaken at a later stage, if required [1,18]. Suprapubic catheterisation without an attempt to anatomically realign urethral fragments results in a 100% stricture rate, in comparison to 60% with initial alignment [10].

Placement of a urethral catheter under direct vision with insertion into a dependent portion of the bladder, which was then sutured to the pelvic floor in a fashion similar to that employed during a retropubic prostatectomy [7], has been reported in both civilian and military environments [17,16,18,2,6,13]. For patients where further surgery cannot be guaranteed, placement of

suprapubic and urethral catheters with initial anatomical realignment is arguably sufficient, as was undertaken in the series of patients. After catheter removal, the urethral catheter can be replaced if incontinence is a problem or a suprapubic catheter placed if a urethral stricture causes urinary retention.

In patients for whom further reconstructive surgery can be guaranteed, we advocate urethral catheterisation and anatomical realignment of extensive posterior urethral injuries technique as best practice, as it provides the first step in the reconstructive process and results in a lower urethral stricture rate when compared to suprapubic catheterisation alone.

## 6. Conclusions

Complete disruption of the male urethra can be successfully managed in the field hospital by urethral catheterisation at the time of the initial surgery. In patients where further reconstruction may not be possible, urethral catheterisation provides a culturally permissible solution for patients. In those who may undergo further reconstructive surgery, approximation of the bladder to the pelvic floor may reduce stricture rate in comparison with suprapubic catheterisation alone.

## Conflicts of interest

This paper has received no additional funding and we have no conflicts of interest to declare.

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